

**NFPA**

# **Commentary on the “Homebuilder Supporting Facts on Residential Fire Sprinklers”**

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[This document provides commentary on the referenced homebuilder report. It is intended to update information, examine analyses for validity, and express NFPA's position with regards to the inclusion of residential fire sprinklers in the State of Washington. This document will contain the section of the report , followed by commentary notes in red]

### ***US Fire Deaths***

Over the past three decades the number of individuals dying in fires has fallen dramatically. Between 1977 and 2007 the number of U.S. fire deaths declined 54 percent.

This reduction understates the true improvement in fire safety, as the US population grew by more than 80 million persons during the 30 year period. The fire death rate per million people, a better measure of fire safety, fell from 33.6 in 1977 to 11.4 in 2007—a full 66 percent.

According to the last available U.S Fire Administration statistics (2005 figures), the fire fatality rate for the United States was 12.3 per million in 2005 – Washington ranked 15<sup>th</sup> lowest in the nation.

### **NOTE:**

The United States' fire mortality rate ranks sixth among the 25 developed countries for which statistics are available (CDC, 2009 – Resource 2). Is it acceptable that the country with the most advanced technology and resources in the world maintains a higher fire death rate than 19 other developed countries?

Washington states' 15<sup>th</sup> lowest state fire death rate is not significantly lower than the national fire death rate. The Washington fire death rate is still higher than the fire death rates in most technologically advanced countries. While the long-term trend in fire death rates has been down in Washington and across the country, it is worth noting that ***in the first 71 days of 2009, 18 people have died in fires in Washington, an increase of 157% over the same period the previous year.***

(Brant, R. 2009 – Resource 1). What makes sense for the U.S. as a whole – fire sprinklers in homes – also makes sense for the State of Washington.

As in most states, most fire deaths in Washington occur in residential properties, specifically homes; 73% according to Washington State Fire Marshal's statistics. (Office of the State Fire Marshal (SFM), 2009 – Resource 6) Reducing Washington's fire death toll means reducing its' home fire death toll. Sprinklers are the most effective way to accomplish that.

### ***Smoke Alarms***

According to a study conducted by Charles L. Smith (*Smoke Detector Operability Survey – Report on Findings, 1993*), almost all homes have at least one smoke alarm present, but 63% of home fire deaths resulted from fires in homes without working smoke alarms. Washington's Office of the State Fire Marshal found that approximately 70 percent of the 36 fire fatalities occurring in 2008 took place where no operable smoke alarms or detectors were reported.

#### **NOTE:**

There were 45 fire fatalities reported in the State of Washington in 2008, not 36 as found in the homebuilders' report (SFM, 2009). Residential fires claimed the lives of 33 victims. Of these, 37% occurred in homes with working smoke alarms. A total of 12 lives were lost in homes with working smoke alarms. Were these 12 other lives not worth saving? Maybe this question should be posed to the families of the victims. "Not one more needless death" should be the mantra that drives this policy decision.

***A home fire sprinkler system provides an 80% reduction in fire death rate,*** which means a considerable reduction on top of the large reduction provided by smoke alarms.

Children under age 5 are one and a half times as likely to die in a home fire, and older adults age 65 and older are more than twice as likely to die in home fires as the average person (Flynn, J. 2008 – Resource 3). According to Flynn (2008) alcohol or other drugs, disabilities and age-related limitations are all factors in the risk of home fire death. Persons in these high risk groups are especially likely to have difficulty in using the extra escape time provided by smoke alarms.

Approximately 53% of the people who died in fires in Washington State in 2008 were age 50 or older, and ***seven children age 10 and under lost their lives at home*** (SFM, 2009). These most vulnerable members of the Washington state community are the people most likely to need sprinklers to survive a fire.

## **Age of Housing and Fire Death Correlations**

### ***Older Homes Are At Greater Risk***

Findings from a number of existing studies consistently show that newer homes experience fewer fire deaths than older homes. A study conducted by the National Association of Home Builders (NAHB) in 1987 (*Residential Fire Survey / 1987*) found that fatality rates increased with the age of homes. For example, houses less than seven years old had fatality rates one-third of houses seven to 17 years old, and one-sixth the rate of houses that were more than 25 years old. Nearly identical results were obtained in a California Building and Industry Association study released in 1996 (*Fire Fatalities in Residential Buildings / 1996*). That study found that the average fatality rate in residential dwellings in California consistently increased as the housing stock aged. Interestingly, they found this relationship to be true for every successive four-year period going back all the way to 1956. More recently, it's been found that, in Dallas, residential fire-related injuries declined in every decade for houses built after 1949 (*Istre, G.; McCoy, M.; Osborn, L.; Bernard, J.; and Boulton, A.; "Death and Injuries From House Fires," New England Journal of Medicine / 2001*). That is, houses built in the 1980s were found to be safer than those built in the 1970s, which, in turn, were found to be safer than those built in the 1960s, and so on.

A statistical study prepared by NAHB in 2005 found that residential fire death rates are lower in counties where the housing stock is newer, home prices are higher, and the share of manufactured housing is lower. Analyzing a dataset of actual information from 458 counties using data from the U.S. Census Bureau and the national Center for Health Statistics, the research found that the higher the home prices, the greater the percentage of new construction, and the lower the share of manufactured housing, the lower the fire death rate. Counties with a larger share of new homes have a lower fire death rate because new homes are safer.

### **NOTE:**

"NAHB economists have conducted complex multi-variable statistical models to try to make the point that risks are lower in newer homes. NFPA has pointed out the flaws in those models and shown that significant results are only found when newer homes correlate with wealthier, better educated occupants." (Hall, J. 2009, pg.4, para. 4)

## Questioning The Reliability of Sprinklers

### The Reliability of Fire Sprinklers

The 2009 report, U.S. Experience with Sprinklers by John Hall Jr, is an extremely important report that should be read completely to understand the limitations associated with fire suppression systems. According to the data 55% of all non-confined and confined one- and two- family dwelling (OTFD) fires never reached temperatures that would activate the sprinkler system. Sprinklers failed to operate in 2% of the OTFD and the reasons that they failed were due to insufficient amount of water released (25%), system did not reach the fire (25%), lack of maintenance (25%) or the system was damaged (25%).

### Non-Fire Activation Reports

In addition to providing statistics on activation due to fire incidents, the 2009 report also provides estimates on the number of fire sprinkler activations that occurred for reasons other than fires. Based on data collected in 2003 for all reported fire department responses to non-fire sprinkler activations it was estimated that there were over 4,700 accidental sprinkler activations that occurred. Upon further examination of specific incidents in Texas, Minnesota and Massachusetts the report was able to provide the reasons for the non-fire activation and the percentages of each category. While the table provides a breakdown of the 292 non-fire sprinkler activation incidents that occurred in homes, there is cause for concern based on the number of non- fire sprinkler activations where no water was released. The majority of residential sprinklers installed in one- and two-family dwellings are wet systems, so any reported activation of the sprinkler system should result in some type of water release. The only cause for no water release is if there was a deficiency in the system which would have rendered it incapable to operate during a fire incident.

NOTE: (From John Hall, Jr. author of the cited report)

The NAHB has misread the NFPA report on U.S. experience with fire sprinklers. The fact that just over half the reported fires are too small to activate sprinklers has no implications for or against the proposal to require sprinklers. Obviously, sprinklers provide benefits by keeping fires small that would otherwise have become large. Fires that are too small to activate sprinklers are fires that would not otherwise have become large.

There are rare instances where sprinklers do not operate or are not effective. The NAHB has provided the percentage of fires where sprinklers *do not operate* and combined it with the breakdown of reasons for cases where sprinklers *operate but are not effective*. These are mismatched statistics. NFPA's statistical analysis of the percentage of fires where sprinklers do not operate or are not effective is already factored into our calculations of the very large reductions in life loss and property loss produced by sprinklers. Our analysis of the reasons why sprinklers do not operate or are not effective is input for property managers (including homeowners) and sprinkler companies as they look for ways to make those low percentages even lower and thereby make the already huge benefits of sprinklers even greater.

As for non-fire activations, the NAHB is mistaken in thinking that dry pipe sprinklers are the only sprinklers for which an event can activate the sprinkler alarm but not

cause water to be released. An example is cases where the sprinkler or related piping is struck, causing water to move in the pipe, triggering the alarm but not leading to any water release. This is not the only example, but even this example alone is not uncommon among non-fire activations without water release. The NFPA study, based on actual incident narratives, took care to consider for each non-fire incident whether water had been released. Contrary to the NAHB's statement, there is therefore no legitimate cause for concern that some non-fire incidents have been wrongly categorized. Note, too, that the NFPA study's results were compared to the few previous studies of water damage due to non-fire activations of sprinklers and were found to provide quite comparable results. This is further evidence that the methodology used in the new study was sound.

Finally, it should be emphasized that NFPA's advocacy of sprinkler requirements for one- and two-family dwellings fully reflects all these statistical findings. An honest, unbiased, comprehensive examination of the pros and cons of sprinklers in dwellings shows that they are worth the money and will provide more fire safety benefits than any other identified strategy.

Sources:

1. Brant, R. (March 26, 2009) ***Washington sees rise in fire fatalities in 2009***, Retrieved May 6, 2009 from:  
<http://www.pnwlocalnews.com/kitsap/ckr/lifestyle/41947627.html>
2. Centers for Disease Control (2009) ***Fire Death and Injuries: Fact Sheet***  
Retrieved May 7, 2009 from: <http://www.cdc.gov/ncipc/factsheets/fire.htm>
3. Hall, Jr. J. (May 6, 2009) ***Commentary on the NAHB Recommended State & Local Amendments to the 2009 International Residential Code (IRC)***  
(Attached at the end of this document).
4. Flynn, J (July 2008) ***Characteristics of Home Fire Victims***. Available from:  
<http://www.nfpa.org/assets/files/PDF/HomeVictimsSummary.pdf>
5. Karter, M. (August, 2008) ***Fire Loss in the United States 2007***, Retrieved May 6, 2009 from: <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>
6. Office of State Fire Marshal (2009) ***2008 Fire in Washington***. Available from:  
<http://www.wsp.wa.gov/fire/docs/nfirs/2008firpt.pdf>

**NFPA**

# **Commentary on the “NAHB Recommended State & Local Amendments to the 2009 International Residential Code (IRC)”**

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[May 6, 2009]

[This document provides commentary on the referenced NAHB homebuilder document. It is intended to update information, examine analyses for validity, and express NFPA's position with regards to the inclusion of residential fire sprinklers in the code. NFPA commentary (in blue) follows the area of the document being commented on.]



# National Association of Home Builders Recommended State & Local Amendments to the 2009 International Residential Code (IRC)

Issue: Automatic Fire Sprinkler System

2009 IRC Section - R313

## Recommended Amendment

*Delete the Section in Its entirety as shown below:*

### **~~R313 AUTOMATIC FIRE SPRINKLER SYSTEMS~~**

**~~R313.1 Townhouse automatic fire sprinkler systems.~~** ~~An automatic residential fire sprinkler system shall be installed in townhouses.~~

**~~Exception:~~** ~~An automatic residential fire sprinkler system shall not be required when additions or alterations are made to existing townhouses that do not have an automatic residential fire sprinkler system installed.~~

**~~R313.1.1 Design and installation.~~** ~~Automatic residential fire sprinkler systems for townhouses shall be designed and installed in accordance with Section P2904.~~

**~~R313.2 One- and two-family dwellings automatic fire sprinkler systems.~~** ~~Effective January 1, 2011, an automatic residential fire sprinkler system shall be installed in one- and two-family dwellings.~~

**~~Exception:~~** ~~An automatic residential fire sprinkler system shall not be required for additions or alterations to existing buildings that are not already provided with an automatic residential fire sprinkler system.~~

**~~R313.2.1 Design and installation.~~** ~~Automatic residential fire sprinkler systems shall be installed in accordance with Section P2904 or NFPA 13D.~~

### **Reason:**

The purpose of this amendment is to delete the reference of the mandatory requirement of residential sprinkler systems in all one- and two- family dwellings and townhouses. This change will

provide the homeowner with the continued ability to choose whether or not a residential fire sprinkler system is appropriate for their situation.

NAHB strongly disagrees with the fire services perception of America's fire problem and the proposed solution to reduce the number of fire fatalities that occur each year. In 1977, less than 0.008% of the housing market was affected by structure fires. In 2005, that number was reduced to less than 0.002%. Over the past three decades, there has been a substantial decrease in the number of residential structure fires in relation to the growth of American housing. No one can predict when or where a fire will occur, but to require every home to be equipped with a residential sprinkler system based on the figures below is not cost-effective.

NOTE:

In 2005, there were 76-84 million occupied housing units in year-round one- or two-family dwellings and 85-95 million total housing units in one- or two-family dwellings. There were 287,000 reported one- or two-family dwelling structure fires. That is about 3-4 per thousand. NAHB says the ratio was "less than 0.002%". That is 2 per *hundred* thousand. They are off by a factor of more than a hundred. And they didn't say *reported* structure fires; they just said structure fires. That means unreported fires fall within their scope and the correct ratio is more like 1 in 10 to 1 in 14. NAHB reaches its conclusion about cost-effectiveness of sprinkler systems by underestimating the size of the problem by a factor of more than a hundred.

Consideration as to whether the requirement for fire sprinklers in dwellings be mandatory should remain a local issue. The sole purpose of an Appendix P in the 2006 International Code was to provide local jurisdictions with the means to adopt a code or standard that is applicable to their community. Not every jurisdiction agrees that radon resistant construction, patio coverings, and safety inspections of existing appliances need to be regulated or inspected in their jurisdiction. Contrary to the belief of some activists, several jurisdictions have decided that Appendix P (the provisions for residential sprinkler systems) is not applicable to their state or local jurisdictions. Of

the 47 states that have adopted the International Residential Code, none have adopted the 2006 IRC with the inclusion of Appendix P. During the adoption process in six states, there was a proposal put forth to include appendix P in the formal adoption of the 2006 IRC and the proposal was voted down every time.

According to the U.S. fire administration more than half states in America are below the national fire death rate of 13.6 per million and over the past ten years the number of one- and two- family dwelling fires, deaths and injuries have fallen (6%, 18% and 26% respectively).

NOTE:

Roughly half the states have a fire death rate below the national average. That is exactly what one expects in a distribution around the average, but that fact has no relevance to this issue. NFPA statistics show comparable declines in the number of fires, civilian deaths, and civilian injuries in fires in one- or two-family dwellings. But again, by themselves, these declines say nothing about the need for, or value of, home sprinklers.

While the fire service and sprinkler advocates acknowledge that the median age of a home is 32 years, the connection between fire deaths and the age of the home is elusive. For several years data has been collected for several relevant facts about fires. The cause of the fire, whether smoke alarms were present and were working, type of smoke alarm present, whether the fire was confined and did not activate the sprinkler system.

NOTE:

The second half of the following sentence is important: "...the connection between fire deaths and the age of home is elusive." This is a much softer and less definitive statement than NAHB usually makes and suggests that they are not so sure of the connection as their previous statements have indicated. NAHB economists have conducted complex multi-variable statistical models to try to make the point that risks are lower in newer homes. NFPA has pointed out the flaws in those models and shown that significant results are only

found when newer homes correlate with wealthier, better educated occupants.

While there have been no studies conducted to investigate whether fire fatalities are less likely to occur in newer homes, there is supporting evidence of this in reports issued by NFPA regarding the performance of smoke alarms. According to these reports, there is a significant difference in the number of fatalities and the number of fires when the smoke alarm present. This includes information regarding smoke alarms that were either battery operated, hardwired with battery backup or hardwired.

NOTE:

"While there have been no studies conducted to investigate whether fire fatalities are less likely to occur in newer homes, there is supporting evidence of this in reports issued by NFPA regarding the performance of smoke alarms." The first part of this sentence is erroneous, as noted above; NAHB and NFPA have both conducted studies on any link between fire fatalities and age of home. The second part of the sentence is misleading. What the cited NFPA analysis shows is this: Smoke alarms work, and advanced features of smoke alarms (e.g., hard-wiring, interconnection) work better. Because smoke alarms are easily retrofitted, as are many of the advanced features of smoke alarms, this fact says nothing about new homes other than that they are statistically more likely to have smoke alarms and to have them with advanced features. NFPA analyses have increasingly shifted to estimating the impact of home sprinklers when added to homes with smoke alarms, and those results demonstrate anew the tremendous benefits achieved by sprinklers *on top of* the benefits already achieved by smoke alarms.

According to April 2007 Report "U.S. Experience with Smoke Alarms and other Fire Detection/Alarm Equipment" by Marty Ahrens, 65% of the reported residential home fire deaths occurred in homes where there was no smoke alarm present (43%) or did not operate (22%). Of the 35% fire fatalities that occurred when a smoke alarm was present and operated, it was reported that two-thirds of the non-confined home structure fires occurred in dwellings with battery operated smoke alarms with

the remaining third evenly divided between homes with hardwired and hardwired with battery backup.

Source	Code Cycle Required	# of Fires	# of Fatalities	# of Injuries	Property Damage in Millions
Battery Only	Before 1982	88,300	1,230	5,850	\$2,353
Hardwired only	1982-1992	19,900	170	1,300	\$743
Hardwire/Battery	1992-Present	18,000	210	1,490	\$568

Reference: April 2007 Report "U.S. Experience with Smoke Alarms and other Fire Detection/Alarm Equipment" by Marty Ahrens

NOTE:

This table does *not* show what NAHB claims it shows – that there are fewer fires with advanced-feature smoke alarms – because it does not show how many housing units are so equipped. (This is a recurring theme in many of the analyses performed by NAHB. Important variables needed to make the conclusions valid and place them in proper context are missing).

From this information we can see that as the requirements for smoke alarms changed, as well as other requirements over the years, that the newer stock has had fewer fires and fewer fire fatalities. Along with improvements to the power source, the *National Fire Code* has also increased the number of required smoke alarms in a one- and two- family dwelling over the years. In 1992 it required that all smoke alarms be interconnected.

When you consider the advances made in the requirements of smoke alarms and look at the results in reducing the number of fire fatalities, the solution is educating the public about the importance of working smoke alarms and practicing proper fire prevention.

NOTE:

NAHB would prefer an exclusive emphasis on a strategy of educating homeowners, which would not involve any requirements on them. But they have offered no evidence of the cost-benefit comparison for sprinklers or for an educational program on smoke alarms, let alone of a joint strategy to do both.

The most cost-effective means of reducing the loss of life is through increasing the public's awareness on the use and maintenance of smoke alarms. According to NFPA reports an estimated 890 lives could be saved annually if homes were equipped with working smoke alarms. 65% of the reported fire fatalities from 2000-2004 occurred in homes where smoke alarms were either not present or were present but failed to operate. CPSC surveys have shown that while 88% of the households screened had at least one smoke alarm, 72% of these smoke alarms were battery powered only.

NOTE:

It probably is true that the *most* cost-effective strategy to reduce fire deaths is to build on smoke alarm successes. But that is not the *only* cost-effective strategy and it certainly is not the *most* effective strategy, i.e., the strategy that will produce the greatest reduction in fire deaths. This is nothing more than a bait-and-switch pitch dressed up with irrelevant, inaccurate or misleading statistics designed to confuse readers or confirm people in a position they already hold but not to make or support a serious case for their position.

The Solutions 2000 report clearly concludes that, "To effectively address the fire safety needs of any population, the three E's, **education, engineering, and enforcement**, must be addressed." The report explains that there are some fire risks that may be best dealt with through educational efforts, but others may require increased enforcement or engineering techniques. On its own, each of the three E's "exerts a synergistic effect on the others, however, and together they are much more effective than individually."

Effective solutions for community risk reduction must include the three E's collectively, in

order "to reduce the effects of fire, if not prevent them."

Our position is: Smoke alarms work well and have saved thousands of lives. Sprinklers (as the single most important engineering technique) will save thousands more lives and billions of dollars in property. With these huge benefits – more than any other fire safety strategy can offer – sprinklers are well worth the money. There is nothing in this piece that seriously engages that position.

